Use of resources of the community in a general science course of study at the junior high school level

Willis Kingsbury Paull

The University of Montana

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THE USE OF RESOURCES OF THE COMMUNITY IN A GENERAL SCIENCE COURSE OF STUDY AT THE JUNIOR HIGH SCHOOL LEVEL

by

WILLIS K. PAULL
B.S. MONTANA STATE COLLEGE, 1949

Presented in partial fulfillment of the requirements for the degree of Master of Education

MONTANA STATE UNIVERSITY
1954

Approved by:

[Signatures and dates]

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</table>
CHAPTER I

INTRODUCTION

Every community has a wealth of resources that may be easily used to supplement classroom work in all fields. An alert teacher will recognize this and use the resources as much as possible, whether the community is a large metropolis or a small remote village. Science differs from other school subjects in that some questions which arise can usually be answered by observing or experimenting. In the community, with its various resources, first-hand experiences can be obtained through observations which will help to answer questions and develop concepts.

THE PROBLEM

The problem of this study was to show how the available resources of a community, human and natural, can be used as an aid in the ninth grade general science course.

The purpose of this study was to show how the resources of one particular community were used for a year in teaching of ninth grade general science.

The purposes of using the resources in teaching of science were to (1) create interest in science and the natural resources on the part of the students; and (2) to guide ninth grade students in observing various occupations and to present opportunities for social development through activities such as field trips and interviews.
SETTING OF THE PROBLEM

The setting of the problem was in the Junior High School of School District 17-H in Hardin, Montana, a community of about 2500 population, situated in Big Horn County. The class involved in the study was the ninth grade general science class. The Junior High School has an enrollment of about 280 students of whom the majority come from rural homes.

DEFINITIONS OF TERMS USED

Natural resources. In the use of the words "natural resources" a very broad meaning was intended. Not only were the natural surroundings, such as rivers, land, forests, wild life, and others included, but also the inanimate objects created by man. Also included in the broad definition were the domestic animals and plant life, space, and the bodies therein. In other words "natural resources" in this paper is intended to mean all those things that are not human that may be found in the community.

Human resources. The term "human resources" was meant to include the individual, his special abilities or interests, and groups of individuals such as organizations and working groups. In other words, Man, his knowledge and his intelligence.

Community. The entire area which is under the influence of a town or city. Community in this sense does not mean just the corporate limits of the city but also the
surrounding rural areas that are under the political, economical and social influences of the city itself.

DELIMITATIONS

The delimitations of this study are: (1) it was restricted for one year to the ninth grade level in the Junior High School; and (2) to a general science course with an enrollment of 25 students. A major difficulty and a limitation was that 14 of the 25 students were from rural homes and were dependent upon school bus transportation, thereby making after-school trips for the entire class an impossibility.

ORGANIZATION

Chapter II presents a review of the literature pertaining to the problem. A description of the method followed in finding the resources of the community and the method of determining the curriculum used will be presented in Chapter III. The resources available and the method in which these resources were used will be contained in Chapter IV. Chapter V will present recommendations for use of similar programs.

In this work an attempt has been made to show what resources were available to the science teacher, the method in which they were located, and the method by which these resources were used.
CHAPTER II

REVIEW OF RELATED LITERATURE

A great deal of literature has been presented concerning the use of the resources of a community in preparing an entire school curriculum. Gwynn, Mewha, and many others recommend the use of the community and its resources in curriculum planning. Glazier has recommended the use of community resources in conjunction with a guidance program. Elliot and Duncan report on a survey that authorities agree that the community should be used. These authors state that:

A study of the opinions of 87 educational authorities in the United States show these authorities unanimously agree that the school should make maximum use of the community agencies when they have value for the instructional program.

Furthermore Elliot and Duncan report that the same authorities believe that the teacher and the students should have


5. Loc. cit.
a part in the selection of agencies whose services are to be used.

A general trend in the direction of the uses of the resources in the community has been apparent. Evans\textsuperscript{6} reports this trend as follows:

A trend in science education in the direction of a more systematic and less superficial study of modern science and technology is under way. The school alone cannot do the job. Means must be found to develop cooperative ways of working with the community, with industry, and lay people in order to develop and make available the quantity and quality of educational resources needed to deal with modern science and technology.

The use of the community in the study of other fields as well as science has been urged in the light of the student becoming more familiar with the community and its members. Glazier\textsuperscript{7} reports that a majority of the students intend to remain in their community after graduation, and if they leave at all it will be for a period of post-secondary study.

Group studies, as reported by Nelson\textsuperscript{8} and Weaver\textsuperscript{9}, of the resources in a community with emphasis on making the teacher aware of these resources were made but the treatment of the results and uses of the resources were not definitely

\begin{itemize}
  \item\textsuperscript{6} Hubert M. Evans, "Some Significant Trends in Science Education," \textit{Teachers College Record}, 54:429, May 1952.
  \item\textsuperscript{7} Glazier, \textit{op. cit.}, p. 192.
  \item\textsuperscript{9} Richard L. Weaver, "Using the Community," \textit{The National Elementary Principal}, 32:171, September, 1953.
\end{itemize}
Elkin\textsuperscript{10} reported a method in which the teacher listed all the units usually taught in sixth grade science and under each unit listed the available sources of scientific knowledge in the area around the community. The teacher and the students then determined the units that were to be studied. This was done by questioning the students on their likes in science. The table of contents of the textbook that was being used was consulted and the units or subjects that were not found in the text were ruled out. The availability of resources were then considered and additional units were ruled out. Finally the students voted on the remaining units as to their likes and dislikes and the end result was a course of six units.

Hicks\textsuperscript{11} suggested a method to improve school-community relations by using the community's human resources. A list of the resource visitors were compiled and through the cooperation of these individuals their interests and knowledge were shared with the students.

\textsuperscript{10} Annice Davis Elkins, "The Community Was the Laboratory," \textit{The National Elementary Principal}, 33:192, September, 1953.

\textsuperscript{11} Vernon Hicks, "Using the Community's Human Resources," \textit{The National Elementary Principal}, 32:123, September, 1952.
CHAPTER III

METHODS OF FINDING RESOURCES

In order to use the resources available it was necessary first to set up the course units for the year. This was done by determining the needs of the community and referring to the State Department of Education Bulletin.¹

The determination of the course units was done by conducting personal interviews. Three groups of people were interviewed in regards to what should be included in the science course. A list of suggested course topics was prepared by using topics obtained from the table of contents of several general science textbooks.² The tree groups interviewed were; (1) 27 members of the community, (2) five educators; and (3) 25 students enrolled in the general science course. The community members were contacted in an effort to obtain an opinion of the community on what was desired in this course in regards to community needs and the assumed needs of the pupils enrolled in the general science course. The

¹ The State Department of Public Instruction, Course of Study for the Junior High Schools of Montana. (Helena, Montana: Neagle Printing Company, 1931) p. 128.


-7-
educators were interviewed to make sure that the subjects followed the requirements of the course, and to fulfill the needs of the pupils and the needs of the community as much as possible. The students were questioned to ascertain their interests and their needs. In an attempt to obtain a cross section of the community the members that were contacted were as follows: two doctors, one with a private practice, and one public health doctor; two nurses, one a head nurse in the hospital and one a public health nurse; six farmers, three dry-land farmers, and three irrigated land farmers; two housewives, one a parent of school children and the other a parent whose child had completed school; a manager of the largest local industry; a newspaper editor; a postal employee (letter carrier); seven retail merchants, one hardware store manager, two clothing merchants, one farm implement merchant, one automobile dealer, one grocery store merchant, and one druggist; two stock ranchers; two utility managers, one from the electric company, and one from the gas company; and a veterinarian. In all cases the individuals were asked to study the prepared list of subjects presented and to classify each subject as to its importance. The persons interviewed were asked to rate each subject as to being most important, important, or least important. The results of the interviews with the community members is shown in Table I. The use of the terms most important, important, and least important was in regards to the needs of the pupil and of the community, the creation of interest in science on the part of
TABLE I
SUGGESTED COURSE UNITS AND THEIR IMPORTANCE AS RATED BY COMMUNITY MEMBERS

<table>
<thead>
<tr>
<th>Course Units</th>
<th>Most important</th>
<th>Important</th>
<th>Least important</th>
</tr>
</thead>
<tbody>
<tr>
<td>Air</td>
<td>20</td>
<td>6</td>
<td>1</td>
</tr>
<tr>
<td>Animals</td>
<td>26</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>Communication</td>
<td>21</td>
<td>6</td>
<td>0</td>
</tr>
<tr>
<td>Conservation</td>
<td>27</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Earth</td>
<td>5</td>
<td>12</td>
<td>10</td>
</tr>
<tr>
<td>Energy</td>
<td>19</td>
<td>6</td>
<td>2</td>
</tr>
<tr>
<td>Electricity</td>
<td>23</td>
<td>4</td>
<td>0</td>
</tr>
<tr>
<td>Fire</td>
<td>17</td>
<td>8</td>
<td>2</td>
</tr>
<tr>
<td>Food</td>
<td>12</td>
<td>7</td>
<td>8</td>
</tr>
<tr>
<td>Gravity</td>
<td>10</td>
<td>10</td>
<td>7</td>
</tr>
<tr>
<td>Health</td>
<td>19</td>
<td>8</td>
<td>0</td>
</tr>
<tr>
<td>Heat</td>
<td>21</td>
<td>6</td>
<td>0</td>
</tr>
<tr>
<td>Humans</td>
<td>26</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>Industry</td>
<td>18</td>
<td>7</td>
<td>2</td>
</tr>
<tr>
<td>Light</td>
<td>19</td>
<td>5</td>
<td>3</td>
</tr>
<tr>
<td>Machines</td>
<td>22</td>
<td>5</td>
<td>0</td>
</tr>
<tr>
<td>Magnetism</td>
<td>10</td>
<td>7</td>
<td>10</td>
</tr>
<tr>
<td>Materials of Construction</td>
<td>20</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>Meaning of Science</td>
<td>25</td>
<td>2</td>
<td>0</td>
</tr>
<tr>
<td>Minerals and Metals</td>
<td>16</td>
<td>9</td>
<td>2</td>
</tr>
<tr>
<td>Plants</td>
<td>26</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>Rocks</td>
<td>7</td>
<td>11</td>
<td>9</td>
</tr>
<tr>
<td>Soil</td>
<td>13</td>
<td>12</td>
<td>2</td>
</tr>
<tr>
<td>Space</td>
<td>20</td>
<td>5</td>
<td>2</td>
</tr>
<tr>
<td>Transportation</td>
<td>21</td>
<td>6</td>
<td>0</td>
</tr>
<tr>
<td>Water</td>
<td>19</td>
<td>7</td>
<td>1</td>
</tr>
<tr>
<td>Weather</td>
<td>21</td>
<td>6</td>
<td>0</td>
</tr>
<tr>
<td>Work</td>
<td>19</td>
<td>6</td>
<td>2</td>
</tr>
</tbody>
</table>

NOTE: This table is based on a total of 27 persons questioned.
the pupil, and for guidance in citizenship and selection of vocations. A rating of "most important" would then mean that the person interviewed felt that the particular subject helped tremendously to fulfill the needs of the pupils and the community, definitely stimulated and created an interest in science, and greatly aided in the guidance of the pupils. A rating of "important" would convey a feeling on the part of the individual that was interviewed that the subject would fulfill the above mentioned criteria, but not as effectively as the "most important" subjects. A rating of "least important" would mean that the subjects would not have the desired effect that the subject rated "important" would have, although the subject would meet the needs of the pupil and the community, create an interest in science and aid in guidance.

The group of educators that were interviewed consisted of two administrators and three classroom teachers. Two of the teachers were on the staff of the Junior High School and one of the teachers was a member of the Senior High School faculty. Table II shows the results of the interviews with these individuals.

The group of students interviewed were all members of the ninth grade class who had enrolled in the general science course. Fourteen of these people were from rural homes and lived on the family farm or lived on leased farms. The remaining eleven students were from homes in the community. The class was composed of sixteen boys and nine girls. The results of the interviews with the students is shown in
### TABLE II

SUGGESTED COURSE UNITS AND THEIR IMPORTANCE AS RATED BY SCHOOL PERSONNEL

<table>
<thead>
<tr>
<th>Course Units</th>
<th>Most important</th>
<th>Important</th>
<th>Least important</th>
</tr>
</thead>
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<tr>
<td>Air</td>
<td>5</td>
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<td>0</td>
</tr>
<tr>
<td>Animals</td>
<td>5</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Communication</td>
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<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Conservation</td>
<td>5</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Earth</td>
<td>2</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>Energy</td>
<td>5</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Electricity</td>
<td>5</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Fire</td>
<td>3</td>
<td>2</td>
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</tr>
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</tr>
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<td>0</td>
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<tr>
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<td>Humans</td>
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<tr>
<td>Industry</td>
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<td>Light</td>
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</tr>
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</tr>
<tr>
<td>Work</td>
<td>3</td>
<td>2</td>
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</tbody>
</table>

**NOTE:** This table is based on a total of 5 persons questioned.
Table III.

In determining the subjects of units to use in the course those subjects which had the greatest number of most important ratings by the three groups were used. In one instance, one group did not rate a particular unit most important, this unit was included because it was felt that there was a definite need for it. The group referred to was the student group, and the subject referred to was the unit on "The Meaning of Science". See Table III.

The final decision of the course content was made by the writer after studying the results of the interviews. The units used were; Air, Animals, Communication, Conservation, Energy, Electricity, Health, Heat, Humans, Light, Machines, Materials of Construction, Meaning of Science, Plants, Space, Transportation, Water, Weather, and Work.

Since several of these subjects work well together, and are more or less continuous with one another, they were grouped together. The unit of Light was expanded to include other types of radiant energy since the writer felt that the study of light and radiant energy are inseparable. The subjects were then arranged in the order of their priority and complexity so that the final course was composed of thirteen units. These units were; Unit I, Meaning of Science; Unit II, Air and Water; Unit III, In Space, (the heavens); Unit IV, Weather; Unit V, Radiant Energy; Unit VI, Electricity; Unit VII, Heat; Unit VIII, Plants and Animals; Unit IX, Health and Humans; Unit X, Conservation; Unit XI, Energy,
### TABLE III
**SUGGESTED COURSE UNITS AND THEIR IMPORTANCE AS RATED BY STUDENTS**

<table>
<thead>
<tr>
<th>Course Units</th>
<th>Most important</th>
<th>Important</th>
<th>Least important</th>
</tr>
</thead>
<tbody>
<tr>
<td>Air</td>
<td>18</td>
<td>6</td>
<td>1</td>
</tr>
<tr>
<td>Animals</td>
<td>21</td>
<td>4</td>
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</tr>
<tr>
<td>Communication</td>
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<td>Conservation</td>
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<td>Light</td>
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<td>Machines</td>
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<td>Materials of Construction</td>
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<tr>
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<tr>
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<tr>
<td>Magnetism</td>
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**NOTE:** This table based on the total of 25 persons questioned.
Work, and Machines; Unit XII, Transportation and Communication; Unit XIII, Materials of Construction.

The textbook that was used as a guide for the course was Barnard and Edwards. Since this book was used as the text it was instrumental in the arrangement of the units of the course.

In most cases, during the interviews with the community members and with the educators, it was felt that emphasis should be placed on the agricultural aspect of the units wherever it was possible. This idea was apparent since the economy of the community was dependent to a great degree upon the farming and ranching of the surrounding area.

At the time of the interviews the writer also asked each person to list any information concerning the resources of the community which might be used with the subject matter and the availability of the resources. Along with these suggestions and by the personal observations of the writer a list of available resources was obtained. These resources were then considered as to the practicability of: (1) field trips, where the entire class could be present; (2) surveys by individual members of the class or by small groups of individuals; (3) guest speakers or demonstrators; (4) individual observations; and (5) individual interviews.

The following questions were established as a basis


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for evaluating the identification of the community resources.

1. Were all of the community resources recognized?
2. Were the resources that were recognized of a usable nature?
3. Did the community members that were interviewed represent a cross-section of the community?
4. Were a sufficient number of community members interviewed to determine the true opinions of the community?
5. Did the recommendations of the community members aid in locating the resources?
6. Were the community members well informed as to the content of the suggested topics?
7. Did the topics that were used fulfill the general science course requirements?
8. Were the opinions of the community members influenced by their likes and dislikes of a particular topic or were their opinions influenced by a felt need of the topics?
9. Were school-community relations affected in a favorable way by the interviews?
10. Should the final decision of the course content rest with the interviewer?
11. Could this method of finding the resources be adapted for use in other courses than general science?

In the determination of the resources available many of the community members who were interviewed suggested the same resources. Several resources that were used were not suggested by the persons who were interviewed. These re-
sources were located by observations conducted by the interviewer. Some of the resources were not recognized as being of possible value to the program until after their period of usefulness had passed. These resources were recorded for use again the following year. Some resources were not usable due to their advanced nature. To use these resources a much broader background of science would be necessary for the student. A group of 27 community members were interviewed but this was probably an insufficient number to obtain a good cross-section of the community. The relationship between the community members and the school was improved in that an interest that was lacking prior to the program on the part of the community members seemed to increase to some extent after the program was put into effect. A method of informing the persons, particularly the community members as to the content of the topics needs to be developed. This was apparent when some doubt as to the content of the topics was voiced. With some changes in the specific procedures used in finding the resources of a community this plan could be used in locating the resources to aid in teaching science in another community. Also with appropriate changes this program may be used in conjunction with teaching in other subject fields.
CHAPTER IV

THE RESOURCES AVAILABLE AND THEIR USE

In this chapter the writer will attempt to show the resources that were available to the general science course and the method in which these resources were correlated with the units of study. Also will be included the use of the resources in the units of the course.

THE AVAILABLE RESOURCES

The number of the available resources suggested during the interviews was many. A number of the resources were duplicated and in some cases the resources were not practicable due to their inaccessibility or unavailability.

All resources that were considered useful were investigated by the writer. The human resources such as representatives of local health departments, local merchants, and others, were interviewed and an attempt was made to determine if the individuals would consent to visiting the class, submit to an interview by the students or furnish any information that might be used in any particular unit. At the same time requests for information on additional resources were made. The natural and community resources were investigated by the interviewer to determine location, accessibility, special features, and the purposes these resources might serve. During the survey preliminary plans were made with the owners or representatives of the places to be visited.
These included the possibility of visiting the particular resource, the most convenient period of time, such as the day or week, how large a group the area could accommodate and the approximate time needed to visit the resource.

Following the writer's visit to the resources, they were divided into four groups. Those resources that could be visited by the entire class were considered as "field trips". The resources that for various reasons, such as distance, accommodations, or accessibility could not be visited by the entire class were considered as "surveys". In these cases the resources were visited by small groups who then reported to the class on their observations. In all cases the visits of this type were organized in the classroom.

Those resources that could be visited by individuals alone or in small unorganized groups, and which were not considered as major resources or which were impossible to be visited by either a field trip of a survey group were considered as "observations". Finally, those resources, because of their characteristics which made it impossible to treat them as the others, namely the human resources, were handled in this manner: The individual or individuals were invited to the classroom to talk to the students or a delegation of two or three students interviewed the particular individual and the results of the interview were reported to the class. These particular activities, whether conducted in the classroom or outside of the school, were called "interviews".

The resources that lent themselves readily to field
trips included an electric substation and the distribution and transmission system, a dairy and milk processing plant, a weather recording station, the local water supply system, a sugar factory, and some irrigated farm land.

The resources that were used as surveys were the telephone exchange, a telegraph office, and a private radio station. Also the bakery, a cold storage business, the department of public works, a laundry, a lumber yard, and several farms, both dry land and irrigated.

For observations the resources that were used included a railroad yard, the local airport, the streets of the city, as well as the sky at night, a restaurant, the pupils' homes, a garage, and a service station. Also included were the community feed lot, the garbage dump, and the alleys and the lots of the community.

A service station attendant, several retail merchants, a commercial photographer, an appliance salesman, the deputy game warden, the chief of the volunteer fire department, and an employee of the Soil Conservation Service were all used for interview purposes. Also used were an airplane pilot, a greenhouse operator, a veterinarian, a doctor, a Public Health Nurse, and the parents and relatives of the pupils.

THE USE OF THE RESOURCES

In this section an attempt will be made to explain how the resources were used in each unit of the entire general science course, as the course was set up in the
A code of conduct, for all activities was deemed necessary. The students under the guidance of the teacher developed a set of rules which were followed during all of the activities carried out. These rules fell into two groups, one group dealt with the conduct of the students during field trips, surveys, observations, and interviews, and the other group dealt with the method to be followed in making the arrangements of the activity being carried out. For the rules covering the conduct of the students several section leaders were agreed upon by the students. These leaders acted as monitors, who enforced the general rules and any special rules that may apply to the particular activity. An interpretation of the rules was: the groups were to remain together as much as possible, there was to be no wandering away on the part of any individual, in case of traveling by individual cars a caravan type of traveling was to be used. No smoking was permitted if the trip was during school hours, the class was to remain together until specifically dismissed by a proper authority. Unnecessary loud talking and unnecessary actions were prohibited. An overall rule was suggested, and accepted, in the form of a self-interrogation. "Should I do this?" or in another form, "Would I do this at home or while out with my parents?" This self-questioning seemed to work well and helped to develop self-control and

1. Cf. ante, p. 12.
self-restraint on the part of the students.

With each type of activity a definite technique was used to insure that the purpose of the activity was fulfilled. The technique used for field trips followed that suggested by Heiss, Obourn, and Hoffman\(^2\). Appendix A contains a copy of this technique. The technique used for the surveys was the same as for the field trips except in the case where the writer was not present the instruction enroute was omitted. For observations the plan followed was to evaluate the advantages of the observation, to determine the purpose and to recognize the things to be observed. This was then followed by a report to the class on what was observed and then a discussion on the observation. For the interviews the advantages and purposes of the interviews were determined and the person to be interviewed was contacted in order to make necessary arrangements as to time and place. This was all done by the students. The writer also contacted the person under consideration to insure that the level of the interview was such that the students would understand without too much difficulty. Following each interview a discussion was held to further the understanding of the students. In all cases where a field trip, survey, or an observation was used an appropriate means of thanks and appreciation was sent to the

persons concerned.

The first unit of the course, "The Meaning of Science", dealt with what science means to the scientist and to people who are not scientists, and also dealt with the scientific method. In this unit surveys, observations and interviews were used. The surveys consisted of groups who contacted persons who were not scientists, such as parents, friends and, fellow students to determine the interpretation of the meaning of science and the thinking of these non-scientists in regards to superstitions. The groups of students then made comparative lists of the science meanings and prepared methods of testing the superstitions. Other groups interviewed scientists to ascertain the scientist's meaning of science. The various meanings of science were then presented to the entire class for comparison. Observations were carried out by each student in an attempt to recognize the scientific method being used in solving everyday problems that the students might face. Interviews were also conducted with merchants of the community regarding the use of the words science, scientific, or scientist in the advertising and selling of merchandise. No field trips were taken during this unit primarily to encourage the students to begin to observe their surroundings and there were no resources that would lend themselves to field trips. At the completion of this unit the first major field trip was taken. This field trip was to a sugar beet factory. The field trip extended over an entire morning, beginning with a side trip
to a field where the beets were being harvested. Following the field inspection the group went to the factory where all the processes of refining and packaging the sugar were observed. This trip was scheduled between units for several reasons. One reason is that the operation of the factory is seasonable and only operated during the fall of the year. Another reason was that the students would get first hand experiences in the conduct of a field trip. Students were encouraged to make observations and to take notes on the work of the factory so that these observations could be referred to in later units when a visit to the factory was impossible.

In unit two which dealt with air and water, field trips, surveys, observations, and interviews were used. A field trip to the local water supply system was taken, where several observations of things not directly applying to the units were made for use in later units. Methods of obtaining purifying and storing water were observed. To determine the various uses of air and air machines, surveys of the department of public works of the community were conducted. The rural water supply systems of which there were many, the rural sewage disposal systems, and the uses of water by the department of public works were also surveyed. Observations were made on the use of air and air machines in the community, the use of hydraulic machines, the effect of heavy rain on soil and plant life, and the uses of water in the home. Two additional observations were conducted by two students who observed a sewage disposal system and a commercial
laundry in a nearby, large community, and they reported to
the class on these observations. An interview was arranged
for a local merchant to visit the class and explain air con­
ditioning and air conditioning machines.

In the next unit, Unit Three, the universe was stud­
ied. Field trips for this unit were not practical since over
half of the students were not able to assemble at night due
to the distance they lived from the community. It therefore
became necessary to conduct surveys with as many of the stu­
dents as possible. In these surveys with the aid of star
maps and textbooks the constellations, individual stars, and
planets were observed and identified. Individual observa­
tions were conducted on the phases of the moon and the move­
ments of the stars. An observation of the shadow cast by the
school flag pole was made each day to observe the various
positions of the sun. These observations were made at the
same time every day. An interview made in relation to this
unit was with an airplane pilot concerning the use of the
stars in navigation. Another interview that proved very
interesting to the students was with a member of the Crow
Indian tribe on the mythology of the Indians in regards to
the stars, planets, and the moon.

Unit Four was entitled Weather. This unit was a study
of the various kinds and causes of weather and the methods
used in the forecast of weather. A field trip was taken to
the local gas company where a weather recording station was
maintained. Here the students were able to observe the
recording of air conditions that cause the weather and the method of transmitting the information to the nearest weather bureau station for forecasting purposes. Surveys were conducted with local business men to determine which businesses depend on weather forecasts and to what extent the businesses depend on these forecasts. An observation was made by a student of a weather bureau forecasting center in another community and a report was made to the class.

The next unit was on Radiant Energy. No field trips were included in this unit. An intense survey was conducted by the entire class on the lighting in the school building and a list of suggested improvements or changes were drawn up and presented to the school authorities. Observations of radio and television antennae were made in relation to radio waves and as a continuation of the lighting survey of the school, the students conducted observations on the lighting in the students' homes. A radio salesman spoke to the class about radio waves and their uses. The use of infra-red light and also visible light was discussed by a commercial photographer.

Unit Six was about electricity. In this unit two field trips were taken. One was to the electric substation where the use and construction of transformers was seen and studied. The second trip was through the community and into the neighboring countryside to study the distribution and transmission system of the electricity that was supplied to the community. Surveys were conducted by groups in the various
uses of electricity in the home, in business, and in the school. Observations were made by individuals on the methods of wiring used in their homes and in homes under construction. An interview was made with a service station attendant on the uses and care of storage batteries and the results were presented to the class.

A study of heat was made in the next unit. No field trips were taken for this unit, however a parent who was a home construction contractor was interviewed in regards to home insulation and various insulation materials, of which samples were inspected and tested. A survey was made at the bakery and a cold storage concern to study the methods of heat transfer and its control. Another survey was made by going to various locations in the community to record the air temperature in an effort to determine what effect reflecting surfaces have on air temperature. A survey was made in a clothing store to determine how manufactures make clothing to control heat transfer. Observations were made in the students home in regards with insulation to prevent heat loss, and to the methods of food cooking and again heat transfer.

In Unit Eight Plants and Animals were studied with emphasis on the propagation and care of living things. A field trip was taken to the local feed lot to study the diet of the animals there, enroute, the high school biology laboratory was visited to observe plants growing there. A visit was made to the class by the deputy game warden, who discussed the reasons for and the methods of regulating the number
of animal that were protected by law. An interview with a greenhouse operator was conducted so that students learned about plant propagation and the use of light in controlling the growth of plants. The local veterinarian visited the class and discussed the propagation and care of animals. Observations were carried out by several students to determine the percentage of germination of various seeds.

The title of Unit Nine was Health and Humans. The class made a trip to the dairy and milk processing plant to study the method of pasteurization of milk, the methods used to prevent the contamination of milk, and the processes by which milk products were made. A survey was made at the public health service office to determine which diseases were the most prevalent in the community. A doctor spoke to the class on diseases and the tests that are used to determine immunity to various diseases. Another interview was conducted with the public health nurse. She discussed the services of water and milk purity tests, inspection of food markets, control of epidemics, extermination of insect pests and rats, and education of food handlers, as performed by the health department. Observations were made of any unsanitary conditions around the community and methods of improving these conditions were suggested. The changes in the pulse rate of individuals was observed after various activities. On the way to and from school the students observed people engaged in different activities. The students noted which activities exercised the body generally, which activities
exercised certain groups of muscles, and which activities made seemingly heavy demands on a few muscles.

Unit Ten was a study of conservation. Conservation was stressed in all other units wherever possible. It was intended that this unit would give increased emphasis to the practices of conservation. A field trip was taken to an irrigated farm where an attempt was made to find evidence of the effect of too much water flowing too fast, effects of irrigating steeply sloped land, and of the quantity of soil being carried by water in unlined ditches. Interviews were made with a representative of the Soil Conservation Service who gave an illustrated talk on erosion of soil and on the reasons for preventing range and forest fires. The chief of the volunteer fire department discussed fire prevention and fire fighting. A survey was made on the widespread use of metal substitutes and on the scrap metal of the community that could be retreated. Observations were made on the wastefulness of the community by visiting the city dumping area.

A study of Energy, Work and Machines was involved in Unit Eleven. An interview was made with a parent who discussed various internal combustion engines. An observation was made at the railroad yard to investigate the external combustion engines. A survey was made on the waste of energy in the community and suggested improvements were discussed in the class. Observations were made on an attempt to recognize examples of the six simple machines in the home and
on the way to school.

The twelfth unit dealt with transportation and communication. No field trips were taken in conjunction with this unit. A survey was made of the telephone exchange to gain an understanding of telephone communications. Another survey was conducted to determine how much time various groups of individuals used in listening to the radio and in viewing television. An additional survey was made of the devices used at an airport in a large neighboring community. Highway and street safety devices, and warning signs and signals were observed and reported in the classroom.

The last unit of the course was about materials of construction. An interview was made with a manager of a lumber yard in regards to the various kinds of lumber, tile, cement, and roofing materials that were being used in the community at that time for the construction of homes. In conjunction with this interview many observations were made of the lumber yard to view the material that was discussed. An observation was made of a building under construction, to see the various materials being used.

In all instances of observations and surveys being made, complete reports to the class were given by the student or students involved in the activity. Immediately following any and all reports a follow up in the form of questions and discussions were conducted.

The following questions were established as a basis for evaluating the utilization of community resources for
this program.

1. Were the resources used to obtain information?

2. Were the resources used to realize learning beyond the mere collection of facts?

3. Were all of the students able to participate in all of the activities?

4. Was the method of conducting each activity of a satisfactory nature?

5. Were there resources that were not used which could be used?

6. Could parents be used to help in the carrying out of activities other than being interviewed?

7. Could any particular field trips be used to better advantage by treating them as surveys or observations?

8. Could any surveys or observations be better used by treating them as field trips.

9. Were the purposes of the trip fully established with the students before the trip was taken?

10. Were the follow-ups of the activities a learning experience?

11. Were the presentations of the class visitors adjusted to the level of the class?

12. Were the activities of value to the understanding and growth of the students?

13. Could this type of program be used in another community of the same size and economy?

14. Could this type of program be used in another
community of different size and economy?

15. Was the technique of organizing and conducting the activities satisfactory?

16. Was an interest in science on the part of the student created by the use of the resources?

In some instances the use of the resources was to obtain merely factual information, while in other instances learning was realized. Because of some of the delimitations of the program, such as transportation, all of the students were not able to participate in all of the activities. Often the physical plant of an interview would not accommodate all of the students at one time. The actual conduct of any one activity was necessarily different from any other activity due to the differences of the activity. However a general method of conducting the activities could be used, and the general pattern of the conduct of all activities was the same. Although the resources seemed to fit themselves for certain types of activities some of the resources could be treated in another manner, such as a survey might just as readily used as a field trip. With minor changes this type of program might be easily used in other communities to aid in the teaching of general science. This entire plan was intended to supplement the science course and not to substitute for the science course.
CHAPTER V

RECOMMENDATIONS

This study intended to show how the resources of one particular community were used for a year in teaching science. With a few changes depending on the community differences this plan might be used by teachers of science in other communities. In this chapter an attempt will be made to give some recommendations that may help a teacher to use the resources more effectively and to avoid some of the pitfalls experienced in this program. These recommendations are the results of the questions that were used as bases for the evaluations in Chapter III and Chapter IV.

For a new teacher a trip to the local Chamber of Commerce will be a help in finding just what resources are available. The classified section of the telephone book may also be used in determining the resources that might be investigated for use.

When the investigator is interviewing the community members regarding the suggested course units, a good plan to follow would be to meet with the individual, explain the reason for the interview, leave the suggested list, and make arrangements to return for the results. In this manner the community member will be able to give a little time to the consideration of the choices. By using the interview method instead of a questionnaire a partial view of the attitude of the community in regard to the school may be obtained.
Whenever possible it might be of an advantage to the teacher to visit the parents of the students enrolled in the class to explain the program of using the resources and to ask for their cooperation in making the program a success. At the same time the teacher may find out whether the parent objects to the child taking the trip or not. A mutual understanding of the responsibilities of the child on the trip may also be made at this time. If bus transportation will not be used, this would be the time to make tentative arrangements for the use of the parents' cars. An advantage can be gained if the cars of rural parents can be used. If the time of the activity engaged in extends beyond the time of the departure of the school buses, then the rural children can engage in the activity and still have means of transportation to their homes. This would, of course need exact planning.

If the place to be toured has a special person who acts as a guide it would be advisable for the teacher to make the tour in advance, and at the same time to correlate information with the guide.

Whenever a trip is being conducted merely to obtain information, the advisability of taking the entire class should be considered. On the other hand, whenever a trip is planned to realize learning beyond the mere collection of facts, it might be better to take the entire class.

In some cases the showing of a film on the particular resource may proceed the activity. This could aid in showing
that different means may be used to obtain the same end results in various manufacturing and other processes.

The trip should be approved by the principal and if the students are apt to be absent from other classes because of the length of the trip then the principal should give to each teacher a list of the students who are attending the activity. It would be profitable for the teacher who is conducting the trip to personally check with each teacher to see that they have been notified of the students who may be absent from their classes. Some form of a make-up work sheet should be used and the students should have all work for other classes made up before leaving on the trip. This procedure will help to maintain good intra-faculty relations.

Prior to such activities as surveys or interviews in which the student will talk to community members, some instruction on the methods of interviewing should be given.

A bulletin or news letter might be sent to each parent just prior to the field trip, outlining the objectives and purposes of the tour including the time, the place, any information that is deemed wise, and an invitation for the parent to accompany the group. With this bulletin a permit slip may be sent which, when signed by the parent, will give the parent's consent for the child to go on the field trip.

In the case where a person is to speak to the class several precautions must be observed. If the visitor to the class is in merchandising or professional competition with the parent of one of the students, care must be exercised to
avoid the possibility of advertising in the classroom. Sometimes a personality clash may develop between a pupil and a visitor which should be avoided if at all possible. Planning with the students on whom to invite to the class may prevent incidents similar to those mentioned above.

A discussion of the tour should be carried out with the students and the use of the outline presented in the Appendix or a similar plan can be used as a guide in the pupil-teacher planning. In the discussion of the tour the children should suggest some things that they might expect to see and the teacher should suggest some things that he knows the children will see or hear.

The teacher should not try to cover too much during any one trip as this may lead to confusion rather than to the development of an effective understanding of the processes observed. If the place has been visited previously by the class, or a similar place visited, the teacher should make sure that there are new experiences and learning open to everyone.

During the tour it may be a good plan for either the teacher or some superior student to take notes of the trip, rather than having all the students take notes, as someone may miss something considered important or interesting. If the trip is guided by an employee of the concern the teacher should be a knowledge seeker with the children and leave the details to the guide.

The teacher should assist the pupils in planning any
reports to be given to the class concerning observations or surveys that were made. The teacher should avoid making any of the reports unless it is an observation or interview made only by the teacher.

A form of card catalogue or index may be prepared on the available resources that can be used. These cards should contain information on the resource, its availability, the purpose it will serve, and any special information of the resource.

An attempt has been made in this chapter to point out some things a teacher may look for or do in regards to using the resources of the community. Each individual community will present problems that are peculiar to that community and these problems will have to be solved by the individual who is attempting to use the community resources.

In spite of the fact that this paper deals with the aspect of using the resources in a general science course, certain minor alterations would, no doubt, make the plan adaptable to other courses and other communities. It is the hope of the writer that this study will encourage other teachers to investigate and use the resources of their community in the education of American youth.
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First step. Evaluate the advantages in order that as many as possible may be profitably utilized.

Second step. Determine the purpose for which the journey is to be conducted; or a possible combination of purposes.

Third step. Examine survey data for
   (1) Material that will develop correct concepts.
   (2) Situations around which activities may be organized that will assist pupils in developing desirable attitudes, skills and habits.

Fourth step. Make necessary arrangements with
   (1) School authorities.
   (2) Owners or representatives of places to be visited.

Fifth step. Initiating the journey.
   (1) Develop the need—during class discussion, or group activity.
   (2) Have pupils definitely fix the aims.
   (3) Teacher preparation—familiarity with place, route, features, necessary reference materials.
   (4) Pupil preparation.
      (a) Equipment.
      (b) Study of reference material.
      (c) Spirit of alertness, determination to meet and solve situations.

Sixth step. Instruction en route and the lesson
   (1) On the way—pupils alert, at times noting and listing things seen; teacher a constant guide.
   (2) At the place—the definite lesson; pupils utilizing initiative, self-activity, observation, teacher guiding the organization of pupil observation.
   (3) The return—pupils exchanging ideas, freely discussing experiences, and asking questions.
   (4) The follow-up.
      (a) Reports from students.
      (b) Discussion of reports; questions by pupils and teacher; evaluating reports.
      (c) Coordination of the work.

Seventh step. Appraise the lesson.
   (1) Teaching values.
      (a) Enriching and vitalizing.
      (b) Motivating.
      (c) Socializing.
   (2) Constructive influence on pupils' attitudes, habits, and skills.